Human Capital Investment and Industrial Productivity in Nigeria

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Abstract

This study investigates the relationship between human capital investment and industrial productivity in Nigeria using secondary data spanned through 1978 to 2008. Co-integration and Error Correction Mechanism (ECM) was employed to examine the nexus between human capital investment and industrial productivity. Granger causality test was also adopted as a supplementary estimation method to explore the nature of causality among the variables established in the model. The study found that government expenditure on education maintained a positive long run relationship with index of industrial production while government expenditure on health and Gross Capital Formation exhibited long run negative relationship with the dependent variable. Consequently it was recommended among others that more stock of physical capital needed to be acquired, to facilitate more investment in human capital and thereby enhance industrial productivity in Nigeria.

Keywords: Human Capital, Investment, Industry, Productivity, 1978-2008, Nigeria

Introduction

Nigeria's most important macroeconomic objective remains how to achieve accelerated economic growth and reduce poverty. In order o achieve this laudable objective, certain variables which have the capacity to accelerate growth have to be identified. Of all the contributory variable or factors to economic growth and increased productivity, human capital stands out as a major catalyst. To this end, effective investment in human capital is a key component of long run economic growth and improved productivity.

The United Nation Development Programmed (UNDP) 1997 support this fact and argued that development should focus on investment in human capital which should be seen in the light of how the economy is managed and wealth is distributed for the benefit of the people. On the basis of his reasoning, UNDP has evolved the Human Development Index (HDI) including component variables such as standard of living, knowledge and longevity. The united Nation recommended that at least 26% of the annual government budget should be allocated to education sector in order to enhance human capital development. However, the human capital development indices to Nigeria do not reflect a substantial expenditure on education and health. For instance, an insignificant proportion of financial resources (less than 10% of local government expenditure) in 2009 were allocated to educational sector.

According to African Development Bank Report (1998), human capital development is an essential means of sustained economic growth and also an end in itself. Also, World Bank (1998), assessment of 192 countries indicate that human capital on the average account for 64% of the total wealth while physical and natural capital account for 16% and 29% respectively. One conclusion that can be drawn here is that development process have gone from the resources exploitative model to the knowledge based technology driven which implies that the efficiency with which the physical and natural resources of an economy are being organized in the transformation process is a function of the sophistication of its human resources as rightly noted by Usman (1986). No country has achieved substantial economic development without substantial investment in human capital. Several studies have evolved to analyze the channels through which human capital can affect growth, much of this literature emphasized the complimentary relationship between human and physical capital. Noting how imbalance in those two stocks, as well as human capital externalities, can affect industrial productivity. The highly educated such as scientists and technicians, appear to have comparative advantages in understanding and adapting new or existing ideas into production process.

Investment in human capital is an end or objective of development, it is a way to fulfill the potential of people by enlarging their capabilities and this necessarily implies empowerment of people, enabling them to participate actively in their own development.

Empirical investigations from various researchers have revealed that adequate investment in human capital serves as catalyst for improved productivity and economic growth. The effect of low investment in human capital as noted by Bakare (2006); Lawanson and marimathu (2009), therefore raising a number of concerns for various organizations and research institutions. For instance, Bakare (2006) noted that poor investment in human capital in Nigeria has been found to be consistent with a higher level of illiteracy and a low rate of economic growth. This is particularly worrisome as several questions have been raised on the situation; such as; What has been the trend of expenditure on education in Nigeria? How has the expenditure profile impacted on education? Is there any relationship between the pattern of education expenditure and economic growth in Nigeria? In the past, much of the planning in Nigeria was centered on accumulation of physical capital for rapid growth and development without recognizing the important role played by human capital in the development process. Another area of concern as identified by Sanusi (2003) is the effect of low investment in human capital on the competitiveness of Nigerian labour force in the production of goods and services, bearing in mind the fact that low level of skills and knowledge will certainly reduce the quantity and quality of individual output. The objective of this study is to broadly examine the relationship between human capital investment and industrial productivity in Nigeria.

Review of Related Literature

The Key Role of Education and Health

Education has a wide range of indirect benefits which instigate powerful changes in peoples' attitude to work and society. It makes it easier for people to learn new skills throughout their lives and hence facilitate their participations in modern economies and societies. Education has positive impacts on the economy and so, investment in education and training is imperative if the aim is to propel the economy to higher level of productivity and income and thereby accelerate the rate of economic growth. Education increases the number of knowledgeable workers by improving their skills and enabling them to new challenges. In addition, education enhances their occupational mobility, reduces the level of unemployment in the economy, increases the earning capacity and productivity of the country's work force, improves access to health information which will increase life expectancy and, at the same time lower the fertility rate. Therefore, education is capable of enhancing the efficient production of goods and services by ensuring thorough screening that the best people are selected and made available for the world of research.

Health comes next to education in the development of human resources. There is symbiotic nexus between health and education. Education facilitates general enlightenment in the production as well as acquisition of the varied and much needed skills for the transformation of the society, have the tendency to foster a change in the attitudes and habits which may be conducive to the attainment of high health status particularly, amongst people in developing countries where the major causes of death are largely preventable. So also, for the manpower and resources of a nation to be utilized to harness the other resources of a nation, the population must be healthy. Without good health, productivity is low and to ensure adequate productivity, the majority of the population needs to be protected from illnesses. A strong and healthy labour force is an essential factor in development; it signifies not only absence of disease, but also a high life expectancy and absence of disability and discomfort.

According to Yesufu (2000), a good health policy is a means by which government can at once ensure that manpower is generated in the right mixes distributed in accordance with national priorities and ensure the highest level of labour productivity. Health improvement influences morbidity and labour force productivity. Thereby enhancing the process and speeding of economic development. Most developing countries have given serious attention to the provision of public health, education and social welfare services. This is because; it is believed that such measures could improve the quality of life of their people and their efficiency as productive agents thereby accelerating the general socio-economic development of their nation. Since health and education status affects the individual participation in economic activities and consequently the level of labour force in an economy, a re-examination of the level of investment in human capital and sustainable growth if highly imperative.

Human Capital and Firm's Performance

In response to current global market changes, most firms have embraced the notion of human capital as a good competitive advantage that will enhance higher performance. Human capital development becomes a part of an overall effort to achieve cost effective and firm performance. Hence, firms need to understand human capital that would enhance employees' satisfaction and improve performance. Although, there is a broad assumption that human capital has positive effect on firm performance the notion of performance for human capital remain largely indisputable. The constantly changing business environment requires firm to strive for superior competitive advantages via dynamic business plan which incorporate creativity and innovativeness. This is essentially important for their long term sustainability. Undoubtedly, human resources input play a significant role in enhancing firm's competitiveness (Barney, 1995). At a glance, substantial studies were carried out on human capital and their implications on firm's performance on widely basis and obviously, human capital enhancement will result in greater competitiveness and performance (Sanusi, 2003).

From the individual level, Collis and Montgomery (1995) point out that the importance of human capital depends on the degree to which it contributes to the creation of a competitive advantage. From an economic point of view transaction-cost indicate that firm gains a competitive advantage when they own firm-specific resources that cannot be copied by rivals. Thus, as the uniqueness of human capital increases, firm have incentives to invest resources into its management and the aim o reduce risk and capitalize on productive potentials. Hence, individual needs to enhance their competency skills in order to be competitive.

From the organizational level, human capital plays an important role in the strategic planning on how to create competitive advantages. Following the work of Snell *et al.*, (1999) it stated that a firm's capital has two dimensions which are value and uniqueness. Firm indicated that resources are valuable when they allow improving effectiveness, capitalizing on opportunities and neutralizing threats. In the context of effective management, value focuses on increasing profits in comparison with the associated cost. In this sense, firm's human capital can add value if it contributes to lower costs and provide increase performances.

Theoretical and Empirical Explanations

The Solow neoclassical growth model for which Robert Solow of the Massachusetts Institute of Technology received the Nobel Prize is probably the best known model of economic growth, Todaro and Smith (2009). Although in some respect, Solow's model describes a developed economy better than a developing one, it remains a basic reference point for the literature on growth and development. It implies the economics will conditionally converge to the same level of income given that they have the same rate of savings depreciation, labour force growth and productivity growth. The neoclassical (exogenous) growth model is an extension of Harrod-Domar model of 1946 that includes a new term productivity growth. The key modification from Harrod-Domar's growth model is that the Solow's model allows for substitution between capital and labour. In the process, it assumes that there are diminishing returns to the use of these inputs. The capital output ratio is not fixed as the case in the Harrod-Domar model. These refinements allow increasing capital intensity to be distinguished from technological progress. The key assumption of neoclassical model is that capital is subject to diminishing return. In this model, the Solon residual or total factor productivity is often used as a measure of technological progress.

Solow starting point is that the society saves a given constant proportion of its income. The population and supply of labour grows at a constant rate and capital intensity is determined by the prices of population factor. As a result of diminishing yields additional capital injection (increasing capital intensity) will make even a smaller contribution to production. This implies that in the long run, the economy will approach a condition of identical growth rate for capital labour and total production, presume on condition that there is technological progress.

The aggregate production function $Y = f(K,L)$ is assumed characterized by constant return to scale, for example, in the special case known as the Cobb-Douglass production function, at any time t, we have;

$$Y_{(t)} = K_{(t)}^{\alpha}(A_{(t)}L_{(t)})^{1-\alpha} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where; Y is Gross Domestic Product, K is the stock of capital which may include capital as well as physical capital. L is labour and $A_{(t)}$ represents the productivity of labour which grows over time at an exogenous rate. Because of constant return to scale, if all inputs are increased by the same amount, then output will increase by the same amount;

$\lambda = f(\lambda K, \lambda L)$……. (2)

Where; λ is some positive amount, because λ can be any positive real number, a mathematical trick useful in analyzing the implication of the model is to set $\lambda = {}^{1}/_{L}$ so that;

${}^{Y}/_{L} = f({}^{K}/_{L}, 1)$ or $y=f(K)$……..(3)

Note that the symbol K is used for ${}^{K}/_{L}$, not for ${}^{K}/_{Y}$ as it was in the Harrod-Domar model. This simplification allows us to deal with just one argument in the production function. For example, in the Cobb-Douglass case introduce in equation one above,

$Y = K^{\alpha}$…….. (4)

This represents an alternative way of thinking about a production function in which everything is measured in quantities per worker. Equation 4 states that output per worker is a function of the amount of capital per worker. The more capital with which each worker has to work, the more output that worker can produce. The labour force grows at rate η per year, and labour productivity growth, the rate at which the value of A in the production function increases, occur at rateλ. The total capital stock grows when savings are greater than depreciation but capital per worker grows when savings are also greater than what is needed to equip new workers with the same amount of capital as existing workers have.

The solow equation (equation 5) gives the growth of the capital-labour ratio (known as capital deepening) and shows that the growth of K depends on savings of (K), after allowing for the amount of capital required to service depreciation δK, and after capital widening, that is, providing the existing amount of capital per worker to net workers joining the labour force, ηK that is;

$\Delta K = sf(K) - (\delta + n)K$……(5)

For simplicity, we are assuming for now that, A remains constant. In this case, there will be a state in which output and capital per worker are no longer changing, known as the steady sate (if A is increasing, the corresponding state will be one in which capital per effective worker rises as A rises, this is because when workers have higher productivity, it is as if there were extra workers on the job). To get this steady state, then we set

$\Delta K=0$

$\delta f(K^*) = (\delta + n)K^*$……(6)

The notation K* means the level of capital per worker when the economy is in the steady rate.
In the absence of external "shocks" or technological change, which is not explained in the neoclassical model, all economies will converge to zero growth. Hence, rising per capital GNI is considered a temporary phenomenon resulting from a change in technology or a short term equilibrating process in which an economy approaches its long run equilibrium. In line with neoclassical theory argument, any increase in GNI that cannot be attributed to short term adjustment in stocks of either labour or capital as are ascribed to a third category commonly referred to as the "Solon residual".

In a rather ad-hoc manner, neoclassical theory credits the bulk of economic growth to an exogenous of completely independent process of technological progress. Though intuitively plausible, this approach has at least two insurmountable drawbacks. First, using the neoclassical framework, it is impossible to analyze the determinants of technological advance because it is completely independent of the decision of economic agents. And second, the theory fails to explain large differences in residual across countries with similar technologies.

To illustrate the endogenous growth approach, we examine the Romer endogenous growth model because it addresses technological spillovers (in which one firm or industry's productivity gain leads to productivity gain in the other firm's or industries) that may be present in the process of industrialization. Romer proposes accumulation of knowledge as a driver and means of achieving economic growth. This was further developed by Lucas (1998) who added that it is investment in human capital that have spillover effect that increases the level of technology by external effect on human capital. Romer departs from Solow by assuming that the economy wide capital stock K, positively affect all outputs at the industry level, so that there may be increasing return to scale at the economy wide level.

It is valuable to think of each firm's capital stock as including its knowledge. The knowledge part of the firm's capital stock is essentially a public good, like in the Solow model that is spilling over instantly to the other firm in the economy. As a result, this model treats learning by doing as learning by investing. You can think of Romer's model as spelt out by endogenising the reason why growth might depend on the rate of investment.

$$Y_i = AK_i^{\alpha}L_i^{1-\alpha-\beta}K \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Assuming symmetry across industries for simplicity, each industry will use the same level of capital and labour. Then, we have the aggregate production function as;

$$Y = AK^{\alpha-\beta}L^{1-\alpha} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

To make endogenous growth model stand out clearly we assume that A is constant rather than rising overtime, that is, we assume there is no technological progress. Romer identified three elements that define the differences between knowledge and physical capital;

i. The development of new knowledge has positive external effect of the production possibilities of other firms that is knowledge though can be patented or kept secret but cannot be monopolized by any individual or firm.
ii. The creation of new knowledge exhibit diminishing returns.
iii New knowledge is more profitable when it leads to more efficient production.

Early empirical studies such as ADB (1998) has offered a formal demonstration on how positive spillover effect (pecuniary externality) created by workers' educational training investment decision can give rise to macro-level increasing return in human capital. His model supposes that workers and firm make their investment in human and physical capital, respectively, before being randomly matched with one another. The direct consequence of random match is that the expected rate of return on human capital is increasing in the expected amount of (complimentary) physical capital with which a worker will be provided. Hence, the increase in education for a group of workers induces the firm to invest more in tangible assets, thereby increasing the return to all workers in the economy.

A similar study by Uwait (2002) on human resources development and economic growth in Nigeria concluded from the empirical results that education does not only have positive impact on economic growth but such impact is strong and statistically significant. He noted that, this occur despite the decay in the quality of education at all levels experience since the middle of 1980s, the study pointed that he policy implication of such finding is that greater emphasis should be placed on the improvement of the quality of education if he contribution of human resources (capital) to Nigeria economic growth is to be maximized. In the same vein, Chete and Adeoye (2002) in their study on human capital and economic growth in Nigeria deduced that there is existence of a positive relationship between economic growth and investment in human capital which is an indication is needed pivotal to economic growth as noted by the study.

Adamu (2002) conducted a study on the impact of human capital on economic growth in Nigeria using error correction model. He results shows that investment in human capital in form of education and training can lead to economic growth because of its impact on labour productivity. However, she noted that gains can be maximized only if the right kind of education and training is given to human resources of the nation and if they are fully utilized in order to increase hr productive capacity of the economy and hence achieve rapid growth.

A study carried out by Ogujiuba and Adeniyi (2008) on the nexus between economic growth and human capital development revealed that investment in human capital in the form of education and capacity building in form of training impact positively on economic growth. The study found that investment in human capital accelerates economic growth and as such conclude that Nigeria can only reposition herself as a potent force through the quality of her product from tertiary institution and as well as making her man power relevant in the highly competitive globalized economy through a structured and strategic planning of her educational institution. Babatunde and Adefabi (2005) in their study on the long run relationship between education and economic growth in Nigeria presented a result which revealed that government expenditure on education significantly influence output per worker growth. He result equally shows that there is a long run relationship between enrolment on tertiary level as well as the average years of schoolings with output per worker.

The study further opines that a well educated labour force possesses a positive and significant impact on economic growth through factor accumulation and on the evolution of total factor productivity.

Lawanson and Marimathu (2009), conducted a study on human capital and economic growth in Nigeria with special attention to the key note of education and health and found that there exists positive relationship between government expenditure on education and economic growth because the coefficient of government expenditure on education in performs well in terms of a priori expectation and it is also significant. On the contrary, the study found that the coefficient of government expenditure on health was inconsistent with a priori expectation implying a negative relationship with economic growth. The study concluded that there exists a clear cut and obvious relationship between human capital development and economic growth but the contribution of human capital to growth in Nigeria has been less than satisfactory.

Methodology

The standard methodology of growth studies begins with the neoclassical (Solow) production function. The neoclassical growth theory posits that changes in quantities of factors of production account for growth. (Solow 1957; Khan, 1997; Iyoha 2000).

Considering the production function of this form;

$Yr = f\,(A\ K_t\ L_t)$

Where: Y = Aggregate real output

K = Physical stock of capital

L = Quantity of Labour

A = Level of technology (efficiency parameter)

t =Time Dimension

If we differentiate equation (1) above with respect to time and divided by Y and rearrange the terms, then we obtain;

$^{\Delta Y}/_{Y} = {}^{\Delta A}/_{A} + ({}^{FK\Delta K}/_{Y})({}^{K}/_{K}) + ({}^{FL\Delta L}/_{Y})({}^{L}/_{L})$………………(2)

Where; $^{\Delta Y}/_{Y}$ - rate of growth output

K/K - Rate of growth of capital

L/L - Rate of growth of labour

FK,FL - Social marginal product of capital and labour respectively

$^{\Delta A}/_{A}$ - Hicks neutral state of change of technological process

Following the empirical work of Mankiw *et al., (1992);* and Odusola (1992), the augmented Solow model is presented thus;

$Y_t = A_{(t)}\ K^{\alpha 1}\ L^{\alpha 2}\ H^{\alpha 1}$………………………………..(3)

Where H is human capital, $\alpha_1 + \alpha_2 + \alpha_3 = 1$ (assuming constant return to scale) other variables are as defined earlier. In line with these studies, the empirical model adopted in this study is presented thus;

IIP = *f* (TED, THE, GCF)…………………………. (4)

Where: IIP - Index of industrial production

TED - Total expenditure on education

TEH - Total expenditure on health

GCF - Gross Capital Formation (As proxy for physical capital)

f - The functional relationship

From the foregoing, the estimated model is given as;

$IIP = \alpha_0 + \alpha_1 TED + \alpha_2 TEH + \alpha_3 GCF + U$………. (5)

Where; α_1, α_2 and α_3 are the parameters to be estimated; U – The stochastic error term (Random disturbances). This study adopts the co-integration and error correction model (ECM) techniques to estimate the relationship between human capital investment and industrial productivity in Nigeria.

Also, Granger causality test was employed as a supplementary technique .This provides information on the nature and direction of causality that exist among the variables established in the model. Unit root test was conducted on all the variables in order to ascertain whether the variables are stationary or not and if stationary to determine the order of their integration using the Augmented Dickey Fuller (ADF) test.

Results and Discussion

Unit Root Test Results

The unit root test is conducted on all the variables purposely to determine whether the variables were stationary or not and determine the order of integration (the stationary level) using the Augmented Dickey-Fuller (ADF) test. The table below shows the unit root test result.

Table 1: ADF Unit Root Test Results

VARIABLE	ADF STATISTIC	5%CRITICAL VALUE	ORDER OF INTEGRATION
IIP	-3.406886	-2.9705	I(1)
TED	-3.221613	-2.9705	I(1)
THE	-3.645776	-2.9705	I(1)
GCF	-3.827270	-2.9705	I(1)

Source: Author's computation, 2011.

Table 1 shows the Augmented Dickey-Fuller test results. The result evidently revealed that none of the variables was stationary at level. However, to attain stationary level, all the variables were differenced once and were stationary at first difference. This means that the variables contained a unit root since they were all stationary at the same level.

Johansen Co-Integration Test

The results emanating from the root test conducted evidently indicated that the variable were not stationary at level but at first difference. This implies that parameter estimates using Ordinary Least Square (OLS) regression may produce spurious regression coefficient and thus be misleading (Granger and Newbold 1977). To determine the number of co-integration vectors, we make use of the maximum Eigen value test.

EIGEN VALUE	LIKELIHOOD RATIO	5% CRITICAL VALUE	HYPOTHESIZED NO. OF CE(s)
0.780508	65.77138	47.21	None
0.395314	21.79469	29.68	At most 1
0.152804	7.206373	15.41	At most 2
0.79348	2.397513	3.76	At most 3

Source: Author's computation, 2011.

The long run test indicates one co-integrating equation at 5% significance level. The existence of this co-integrating equation implies that the variables have tendencies and capability to move together and establish or maintain a long run equilibrium relationship. The normalized co-integrating coefficient with highest log-likelihood ratio (in absolute term) is chosen as the long run equilibrium equation and is presented below;
IIP = 3869000 + 0.068927TED – 0.055549TEH – 0.007659GCF

The equation above represents the long run equilibrium equation and shows that only government expenditure on education remains consistent with a priori expectation and maintained a positive long run equilibrium relationship with index of industrial production (IIP), while government expenditure on health (TEH) and Gross Capital Formation (GCF) reflected a negative long run relationship with index of industrial production.

It follows therefore, that a percentage change in (TED) pushed up (IIP) by 6.892% in the long run. On the contrary, a percentage change in (TEH) and (GCF) led to 55.5% and 0.76% unit decreases in (IIP) respectively.

Error Correction Model Results (Parsimonious)

VARIABLE	COEFFICIENT	STD. ERROR	T. STAT.	PROB.
C	2.435498	4144736	0.587612	0.5641
D(IIP(-1))	0.197515	0.225967	0.874086	0.3936
D(IIP(-2))	0.119737	0.210563	0.568650	0.5766
D(TED)	-0.000127	0.000647	-0.195695	0.8470
D(TED(-1))	-2.02E-05	0.00542	-0.037291	0.9707
D(TEH)	5.88E-05	0.000608	0.096701	0.9240
D(THE(-1))	1.41E-05	0.000420	0.033618	0.9736
D(GCF)	2.20E-05	0.000136	0.161893	0.8732
D(GCF(-1))	-2.17E-05	0.000171	-0.127039	0.9003
ECM(-1)	-0.279851	0.149990	-0.865790	0.0785

R-Square: 0.714434
Durbin-Watson Stat.: 2.029286
Source: Author's Computation, 2011.

The table above presents the ECM result, the result obviously shows that the ECM coefficient is correctly signed (negative as expected) given as -0.279851 implying that it will take almost five periods to correct the disequilibrium precisely, about 28% of the disequilibrium could be corrected in each one period. The ECM coefficient is also significant as evident by its probability value given as 0.0785 less than 10% conventional level for significance. Also, the r-square of the model was 0.714434 implying that 71.4% of the systematic and dynamic variation in index of industrial production was explained by the explanatory variables and their lagged value included in the model.

Granger Causality Test Results

NULL HYPOTHESIS	F-STAT.	PROB.	DECISION
TED does not Granger cause IIP	0.47065	0.63024	Accept H0
IIP does not Granger cause TED	0.10516	0.90059	Accept H0
TEH does not Granger cause IIP	0.47681	0.62052	Accept H0
IIP does not Granger cause THE	0.07233	0.93043	Accept H0
GCF does not Granger cause IIP	0.34155	0.71406	Accept H0
IIP does not Granger cause GCF	0.23269	0.79417	Accept H0
TEH does not Granger cause TED	3.76404	0.03786	Reject H0
TED does not Granger cause THE	7.30116	0.00334	Reject H0
GCF does not Granger cause TED	5.18215	0.01347	Reject H0
TED does not Granger cause GCF	0.87072	0.43146	Accept H0
GCF does not Granger cause THE	8.42131	0.00170	Reject H0
TEH does not Granger cause GCF	0.52441	0.59853	Accept H0

Source: Author's Computation, 2011.

From the table 4.2.5 above, it is evidently clear that there exists a bi-directional causality between IIP and all the explanatory variables. This implies that the present value of IIP cannot predict the future value of any of the explanatory variables and vice-versa. However, the test indicated that, there exists also a bi-directional causality between government expenditure on education and government expenditure on health because the two variables Granger cause each other as evident by their probability value. In a different manner, the test equally shows that there is a unidirectional causality between Gross Capital Formation (GCF) and both government expenditure on education and on health (TED and THE). GCF Granger cause both TED and TEH but none of the two Granger cause GCF. This is also evident by their respective probability value.

The analysis of the long run test revealed only government expenditure on education (TED) maintained a long run positive relationship with index of industrial production. Although, this is a good performance in term of a priori expectation as it is a positive value and it implies that changes in government expenditure on education will generate increase in industrial productivity which by extension spur economic growth.

This result is in line with previous empirical findings of Babatunde and Adefabi (2005) and Adamu (2002) that have carried out similar studies on the impact of human capital on economic growth. However, it is worthy of note here that despite this result conformed to the a priori expectation; it reflected a relatively low magnitude than would have otherwise been expected. But as noted by Ogujuiba and Adeniyi (2008), these empirical findings could be attributed to a host of interplaying factors such as decay in most of Nigerian tertiary institutions, incessant strike and disruption of academic activities, inadequate funding and poor infrastructure development in this sub-sector.

A disheartening result which signifies a big threat to the future productivity of the Nigerian labour force in particular and economic growth at large is the result recorded by the relationship between IIP and TEH which was found negative. This result is in agreement with Lawanson and Marimathu(2009), who have also conducted a similar study and found the same result. The result is a gross deviation from the expectation but truly obviate the scenario in the Nigerian health sector as evident by the deplorable state of health facilities. Although, one might be surprise at this highly embarrassing and disgusting revelation but is should be sufficiently noted that government expenditure and budgetary allocation is a function of political decision rather than economic consideration. In line with this fact is the argument of Aigbokan *et al*, (2007) who noted that a cursory look at the magnitude and trend of increase in allocation to health and education sector in Nigeria might be misleading in passing judgment on budgetary performance until they are placed side by side with their percentage allocation. He further opines that the characteristics pattern of the government allocation to education and health in Nigeria as a percentage of focal budget revealed inconsistency and that health and education were not considered as policy target in the overall budgeting or else, they would have maintained an increasing proportion of the yearly budget of the nation. It would be recalled that the UN international recommended standard for allocation to education sector 1s 26% of the annual budget in which Nigeria has not for once exceeded 10%, the 2011 budget benchmark stipulated just 8%.

Another mind burgling result was that of Gross Capital Formation that was also negative. Following the principle of economic theories, accumulation of physical stock of capital should serve as complimentary factor to human capital and spur growth (Harrod-Domar model). But the result which emanated from our analysis reflected opposite in the Nigerian case. The reason for this may be partly because Nigeria has not been able to mobilize or accumulate sufficient sock of capital that could have propelled growth and this should not e unexpected in a country like ours characterized by poor investment climate, low national savings, massive importations and high rate capital flight.

Conclusion and Recommendations

Based on the theoretical presentation and empirical findings that emanated from the study, there exist a clear-cut and obvious relationship between human capital investment and industrial productivity but the contribution of human capital to industrial performance has been less than satisfactory in Nigeria. The reason being that two out of three explanatory variables used in the study revealed a negative relationship with the dependent variable which is contrary to the "a priori expectations" while the only positive explanatory variable has a very low magnitude which implies little contribution to industrial productivity in Nigeria.

Considering the conclusion that human capital investment enhances industrial performance but the evidence from empirical findings revealed that Nigeria is yet to benefit fully from it. Therefore, government should increase not just the amount of expenditure on education and health sector but also the percentage of its total expenditure accorded these sectors. The ten percent benchmark proffered by the current national plan document as contained in National Economic Empowerment and Development Strategy (NEEDS) should be geared up and gravitate towards the UNESCO 26% international recommended standard. Better infrastructural facilities should also be provided for existing schools and hospitals while new structuralized training institutions should be established to provide quality education and training so as to improve the skills of the Nigerian labour force. Finally, more stock of physical capital should be accumulated so as to finance more investment in education and health and thereby enhance human capital development in Nigeria.

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